Feb. 14, 1956 G. P. HUNGERFORD ET AL 2,734,510

TOBACCO SHEET MATERIAL AND METHOD OF FORMING

Filed Aug. 25, 1955 2 Sheets-Sheet 1

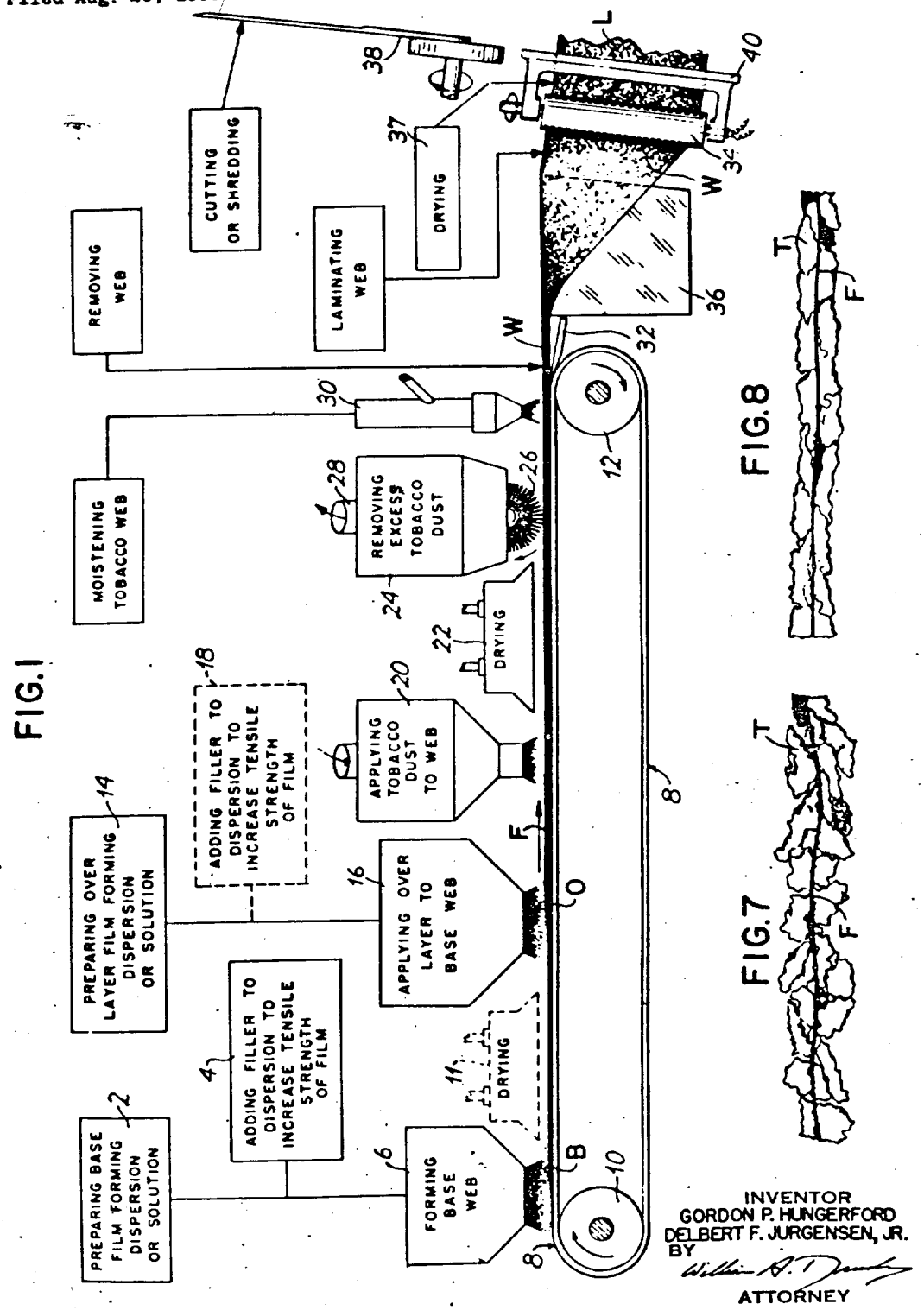

FIG. 1

FIG. 8

FIG. 7

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TOBACCO SHEET MATERIAL AND METHOD OF FORMING

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FIG. 2

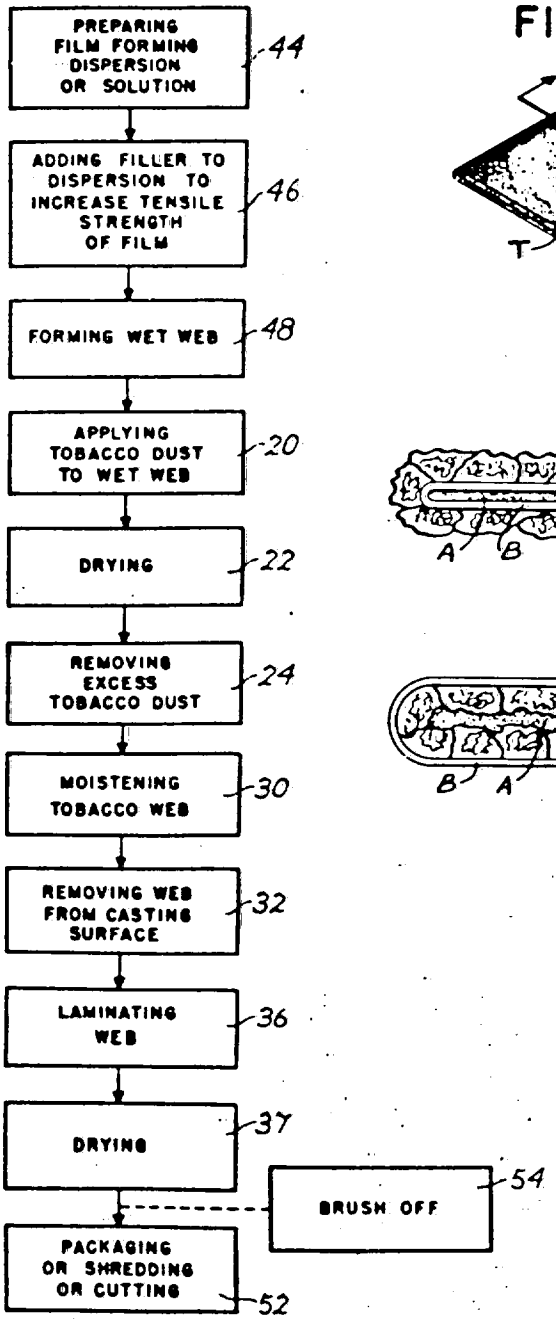


FIG. 3

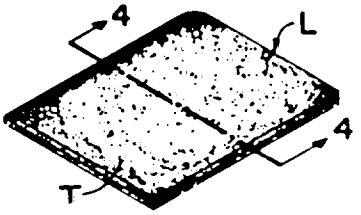


FIG. 4

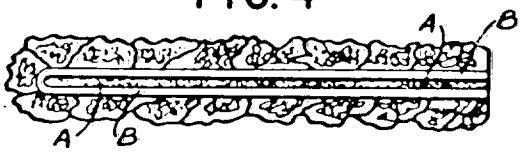


FIG. 5

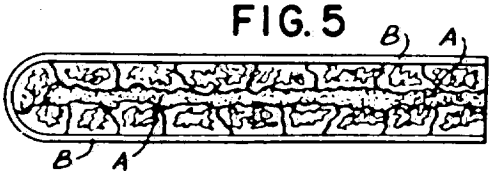
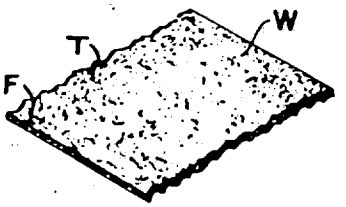


FIG. 6



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TOBACCO SHEET MATERIAL AND METHOD OF FORMING

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Application August 25, 1955, Serial No. 530,561

49 Claims. (Cl. 131—15)

This application is a continuation in part of copending application Ser. No. 124,042 filed October 28, 1949, now abandoned.

This invention relates to improved reconstituted tobacco sheets, films, webs, strips and filaments, hereinafter usually referred to as tobacco sheet, or strip material, and to improved methods of producing the same.

The manufacturer of tobacco products generally buys tobacco in the form of whole leaves as removed from the tobacco plant by the farmer. In processing this tobacco, the stem is frequently first removed and then further processing proceeds as desired. In the case of cigarette manufacture, this includes aging, blending, casing and cutting the strip, which is the tobacco laminae remaining after removal of the stem, into shreds and then drying, cooling, screening and forming the shredded tobacco into cigarettes, followed by packaging. In all these operations, which involve much handling of the tobacco, waste fines and dust are formed. At the present time these waste materials, stems, field scrap (farm damaged leaves), fines and dust have essentially no value to the tobacco manufacturer, and are sold to manufacturers of fertilizers, and insecticides at a fraction of a cent per pound. Much of this waste tobacco material is of good quality from a smoking standpoint. Indeed it is believed that this waste tobacco material contains a disproportionately high percentage of the very best quality smoking tobacco, since the latter comprises the thinnest, lightest, most friable leaves which would most readily break up into fines and dust on handling. These high quality fines are useless now only because of their physical form. A technique for processing this good tobacco into a form which would render it usuable in smoking articles without essential change in its smoking characteristics would therefore be attractive to a tobacco manufacturer since it would tend to reduce manufacturing costs.

It has been suggested previously that reconstituted tobacco strip material be made by wet milling a mixture of tobacco in water to form therefrom a slurry which can be converted, as by any well-known casting and drying method, into continuous self-supporting sheets and strip material.

Other attempts to solve the problem of forming a satisfactory reconstituted tobacco sheet material could be cited, such as by forming tobacco paper using well-known paper-making techniques, and also by forming calendered tobacco impregnated films. However, despite these attempts, little success has been achieved and to our knowledge, none of these processes has ever been used commercially.

The present invention constitutes a solution to the problem of reconstituting tobacco materials by converting them into reconstituted tobacco sheet or strip material which can be used in the same manner as natural leaf tobacco in tobacco products such as cigarettes, cigars and the like. Tobacco sheet or strip material made in accordance with our invention is elastic, flexible, tough, self-supporting and continuous, and possesses dry and wet strengths comparable to that of natural leaves or pieces of tobacco, and retains substantially all natural characteristics and properties of tobacco, including color, aroma, and taste on smoking. This is necessarily true since in our process, the waste tobacco is merely dry ground, then deposited onto the top surface of a film-forming material. Thus the principal portion of the tobacco does not contact water or other foreign processing material, nor is its basic physical form (a natural, fibrous, somewhat porous, cellular structure) destroyed by the grinding or milling which is characteristic of previously suggested procedures. Therefore, this process, unlike many that have been previously proposed for utilization of waste tobacco materials, would allow the utilization of such tobacco materials without change from the natural chemical condition in which they exist in normal smoking products. This constitutes an important advantage of our process.

It is an object of our invention to provide an improved method of making novel reconstituted tobacco sheet or strip material in which a continuous wet web is formed from a film-forming material to which finely ground tobacco is applied so that the ground tobacco material adheres to the film-forming material in the wet web, and forms an integral part of the web of reconstituted tobacco material produced.

It is a further object of our invention to provide an improved method of making novel reconstituted tobacco sheet or strip material involving the formation of a base layer of a film-forming material and applying thereto an overlayer of a film-forming material, and while the latter is in wet condition, applying, as by blowing, finely ground particles of tobacco to the top thereof, such that the ground tobacco particles adhere thereto, the resulting product having characteristics similar to those of natural tobacco.

The invention also consists in the provision of an improved method of reconstituting tobacco by forming a wet layer of a film-forming material on a base web of similar film-forming material and then applying, as by blowing, finely ground particles of tobacco to said wet web, after which the web is dried, treated as by brushing, to remove excess tobacco, laminated and preferably treated by heated rollers to compact the outwardly projecting tobacco particles to form a porous, reconstituted tobacco sheet or strip material which can be made into filaments by shredding, or cut into sheets or strips for use in making smoking articles such as cigarettes, cigars and the like.

With these and other objects not specifically mentioned in view, the invention consists in certain features which will be hereinafter fully described, and then set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification, and wherein the several reference characters designate the same or like elements:

Figure 1 is a diagrammatic, schematic illustration disclosing the preferred method of performing the invention;

Figure 2 is a view showing diagrammatically a modified method of producing our novel reconstituted tobacco sheet material;

Figure 3 illustrates a piece of the laminated reconstituted tobacco produced by our method;

Figure 4 is a sectional view, greatly enlarged, taken on line 4—4 of Figure 3;

Figure 5 is a cross-sectional view, greatly enlarged, of a modified type of our novel reconstituted tobacco sheet or strip material in which the tobacco-covered surfaces of the film are adhered to each other;

Figure 6 is a view showing a single thickness of our novel reconstituted sheet material;

Figure 7 is a diagrammatic, cross-sectional view of a highly magnified piece of our novel reconstituted tobacco material not heat-pressed; and

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Figure 8 is a view, similar to Figure 7, showing the material after being heat-pressed.

Referring to the drawings, in Figure 1, which shows diagrammatically the steps covering the preferred method of our invention, 2 designates the step of preparing a dispersion or solution of a film-forming material used in making the base web of our reconstituted tobacco sheet. Any film-forming material can be used which possesses adequate strength, retains the tobacco particles well, and which, on smoking the final reconstituted tobacco film, does not cause an unsatisfactory taste, aroma or harshness in the smoke. Stated otherwise, the film-forming material used does not introduce disagreeable flavors or aromas into tobacco smoke. Hence its presence is not objectionable to smokers or users of the product. Suitable film-forming materials are soluble salts of carboxymethylcellulose and carboxymethyl hydroxyethyl cellulose, or carboxymethylcellulose and carboxymethyl hydroxyethyl cellulose, the latter two being insoluble in water, but, as described hereinafter, capable of being formed into stable water dispersions in the manner described in a copending application filed by Newton Heimbach on December 21, 1949, for Water Insoluble Coatings, Films and Adhesives and Method of Making Same, Serial No. 130,858. These dispersions are capable of being cast to form a wet web which when dried, becomes a self-supporting film. The terms "carboxymethylcellulose" and "carboxymethyl hydroxyethyl cellulose" where used herein, mean the free acid form of these compounds.

While the strength of films formed from the above-mentioned types of dispersions or solutions is high, it is preferred to add a small quantity of an inert and tasteless filler to the dispersion or solution before forming into the wet web or filament to increase the tensile strength of the product (as indicated at 4 in Figure 1). Materials such as kaolin and fuller's earth have produced satisfactory results. Finely ground tobacco waste may also be used for this same purpose. Also, strengthening and/or waterproofing materials, such as glyoxal, which presumably react with the film-forming constituent to modify the type of intermolecular or intermicellar linkages, can be added, if desired, to the above-mentioned solutions and dispersions. When a filler and/or additive is used, it is mixed with the film-forming solution or dispersion, after which the dispersion is converted in any suitable manner as by coating or spraying upon a film-forming surface, into a continuous layer or wet web and dried as desired to form continuous self-supporting dry sheets or strips, as the case may be.

As indicated in Figure 1, the film-forming dispersion or solution is applied, as by spraying, by a suitable device 6 upon the surface of an endless traveling belt 8 to form a continuous wet web, which in the preferred method, is termed the base web B. If desired, small sized individual sheets can be cast directly at spaced intervals on belt 8 or on flat plates (not shown). Belt 8, or plates (not shown) upon which film B is cast or formed in any other suitable manner, are best made of a material which will not react noticeably with the film-forming material to cause discolorations, spots or marks. Suitable materials for this purpose are stainless steel, or chromium-plated belts or flat endless bands, or flat plates of the same materials or similarly treated materials.

Belt 8 runs on driven and driving pulleys 10, 12, preferably continuously driven in order that the web may be moved by the upper lap of the conveyor belt past the several stations necessary to complete the operations of the method. Following the casting of base web B on belt 8, the moving belt carries the wet base web B through a drying station indicated generally at 11, after which an overlayer O is applied to the upper surface of the base web B. While it is desirable to dry base web B before the application of overlayer O thereto, this step may be omitted and satisfactory results will be obtained.

Overlayer O is prepared in the same general manner as base web B. That is, an aqueous solution of sodium carboxymethylcellulose or aqueous dispersion of carboxymethylcellulose, or other suitable film-forming, adhesive material, which will bond to both the base web and the tobacco particles, is prepared, as at 14, and applied by a suitable applying device 16 to base web B. If desired, a filler such as kaolin can be admixed as at 18 with the overlayer adhesive solution or dispersion prior to its application to the surface of base layer B. Also, strengthening and/or waterproofing materials, such as glyoxal, which presumably react with the film-forming constituent to modify the type of intermolecular or intermicellar linkages, can be added, if desired, to the above-mentioned solutions and dispersions. The base layer B and overlayer O are substantially equal in width and extend approximately to the longitudinal edges of endless band 8, although obviously the web width can be varied as desired. It is usually preferred that the solution or dispersion used in forming overlayer O be less viscous than that used in making base web B. It is advantageous to make the base web of high concentration to minimize the amount of drying required at 11 and advantageous to make the overlayer comparatively fluid to obtain maximum strength of bond between the tobacco particles and the film-forming base web.

It has been found that satisfactory reconstituted tobacco sheet or web material, made in accordance with our invention, is formed when the base web and overlayer web are formed of a solution of sodium carboxymethylcellulose, or an aqueous dispersion of carboxymethylcellulose. A satisfactory product is also produced when the base web is made of a solution of a soluble carboxymethylcellulose salt and the overlayer web is formed from an aqueous dispersion of carboxymethylcellulose, or vice versa. It is, however, preferred to use carboxymethylcellulose for both layers B and O because the final product then exhibits greater resistance to the steam and moisture used in "casing" tobacco in the tobacco factory and to the saliva in the smoker's mouth.

Following the application of overlayer O to base web B, the wet composite web on conveyor 8 moves to a tobacco dust applying station 20, where mechanism of suitable design applies tobacco dust to the entire surface of the wet web moving therethrough. The term "dust" as used herein is intended to mean ground or finely divided tobacco. It may be formed from tobacco of any suitable type, as for instance, whole leaves or portions thereof, stems, or waste tobacco including field scrap, or clippings, dust, siftings and chips resulting from the manufacture of cigarettes, cigars and other tobacco products, or from whole tobacco plants including stalks and whole leaves attached thereto. In preparing this "dust," it is believed preferable to separate and remove foreign material such as sand and dirt which oftentimes is mixed with tobacco. The latter is then dry ground to a suitable particle size. We have found that satisfactory results are obtained when the particles are 7 microns minimum size, 600 microns maximum size, and average between 100–150 microns, although this is not critical, and depends upon the characteristics desired in the finished product.

A suitable device for applying tobacco dust to the surface of web O is a blower connected by a conduit to a nozzle, the latter being moved back and forth across the moving wet web O as the air blast forces tobacco dust from the nozzle into adhering relationship with the web, whereby substantial quantities of dust adhere thereto.

In the application of tobacco dust to the wet composite web consisting of base film B and overlayer film O, an excess of dust is usually applied, as by blowing at overlayer O, in order that wet overlayer film O will be thoroughly coated.

The quantity of tobacco dust per unit area of product

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can be varied by changing the air velocity, quantity of dust blown onto wet web O, viscosity of web O, its thickness, and the particle size of the tobacco dust, to obtain the product desired. In a typical case, when the wet web O is 10 mils (ten one-thousandths of an inch) thick and its viscosity is 800 centipoises, and a great excess of tobacco dust is blown upon the wet web O at 7000 ft. per minute air velocity, tobacco loadings up to 8–12 grams per square foot have been obtained. The ratio of dust applied to the surface of web O, as by blowing, to dust adherence to web O, varies depending upon the dust loading desired. If light loading of dust is desired, a small quantity of dust per unit area of web is applied and a large percentage adheres to the wet web. When striving for heavy loading of web O, larger quantities of dust per unit area are applied to the web relative to the amount that adheres thereto. In operation, we adjust the quantity of dust applied or blown upon the web until a desired loading is obtained, or until a maximum loading is obtained.

It is noted that because of the excellent tensile strength of our web, it is possible to load the web with tobacco dust until the final tobacco sheet or strip material produced is very predominantly tobacco. However, tobacco sheet made according to this invention may range in composition from 50 per cent or more of binder material to as little as 4 per cent or less binder material on a dry basis where the remainder of the sheet is tobacco material. Preferred tobacco sheet, made according to this invention, ranges in composition between twice as much tobacco as adhesive film on a dry weight basis per unit area and twenty times as much tobacco as adhesive film on a dry weight basis per unit area. We have made satisfactory reconstituted tobacco sheet or strip material in accordance with the invention with a loading of 85 parts of tobacco by weight in the finished material to 15 parts by weight of film or web forming material, including fillers and/or humectants. It is possible to increase the tobacco loading still further depending upon the desired tensile strength, thickness of film, plasticity, and other characteristics desired in the final reconstituted tobacco sheet material. In short, our product is mainly tobacco held together by a relatively thin, light-weight, web or net of high tensile strength film or web-forming material, which on smoking, has substantially no objectionable or deleterious sensory reaction to a smoker. Dust which does not adhere to the wet web is recovered from the air stream in which it is blown upon the web, and reused.

From what has been said above and as noted hereinafter, the heavy tobacco loading is well in excess of five times the weight of the film per unit area. As noted above, tobacco loadings up to 8–12 grams per square foot have been obtained in the final product. Where, as shown in Example 6 given hereinbelow, which describes an example of our reconstituted tobacco material, the weight of the film which is loaded with the tobacco dust and fine particles is 1.3 grams per square foot, it is readily apparent that the tobacco loading ranges between 6.15 and 9.23 grams per square foot.

As shown in Figure 1, moisture can be removed from tobacco coated web O by any known suitable moisture extracting device 22, after which the tobacco covered composite web W, shown in exaggerated thickness in Figure 1, consisting of base layer B, overlayer web O and the layer of tobacco dust adhering to overlayer O, is subjected to the operation of removing excess, loosely adhering tobacco dust from the surface of web W. This is effected by means of any suitable device 24, such for example as transversely extending rotary brush 26 mounted in operative relationship with a suction exhaust 28. The dust thus removed may be recovered by any suitable known means and reused. The brushed, continuous tobacco sheet or strip material is then subjected to a moistening operation which is advantageous to the satisfactory removal of the sheet or strip W from conveyor 8. As shown, any known type of moistening device can be used, such as a spray or atomizing device which will spray water in a mist upon the upper surface of the sheet or strip W. The moisture content of the sheet or strip W is thus raised to facilitate its removal from belt 8, as by a doctor blade 32. We have found that a moisture content of approximately 30% gives good results. This can be varied widely, however, depending upon thickness of film, tobacco loading, and method of removing the sheet or strip W from the belt.

Upon removal of the sheet or strip W from conveyor 8, the conveyor belt side of the sheet may be coated with a parting agent such as ground tobacco or talc to prevent sticking. The sheet may then be passed between heated or unheated pressure rollers, if desired, to increase the apparent density of the product. The sheet or strip is then dried as at 37 to the desired final moisture content, e. g. 10–12%, after which it may be reeled into rolls, or cut into sheets, sections or shreds as desired. Obviously the order in which these operations is carried out is not critical. For example, the moist sheet might be first cut into sections and then dried.

It is, however, preferred to form a laminated tobacco sheet or strip material structure. This effectively prevents any tendency of films or sheets to stick together when reeled or stacked and also results in stronger films. One way of laminating the sheet or strip W is indicated in Figure 1. This includes feeding sheet or strip material W by any suitable web feeding means, such as coacting rollers 34, over a stationary plow member 36, whereupon sheet or strip material W is folded longitudinally into two continuous sections which are brought into back to back relationship, and due to the adhering qualities of base film B, unite under the pressure of rollers 34 and form a laminated film or web L. Sheet or strip material W can also be laminated by bringing two strips of continuous film into back to back relationship and pressing them together as by rollers 34. This produces a laminated sheet or strip material having the general appearance shown in Figure 7, and in greatly enlarged detail in Figures 3 and 4. Rollers 34 may be heated or very high pressures may be used with a comparatively moist sheet so that as the two sheets or strips are being pressed together, the sections thereof or portions are not only joined firmly together, but also particles of tobacco projecting upwardly beyond the plane of the face of the web film, are compacted and pressed downwardly into more or less contiguous relationship, but not forced to any significant extent into the film. Figure 8 shows the sheet or strip after such pressing. By this technique, it is believed possible to control the burning of the product to some extent, since by hot pressing, or by high-pressure pressing while moist, the apparent density of the product may be somewhat increased, tending to result in possibly slightly more distillation of tars and resins (less complete combustion) when the product is smoked. Also, the pressed product exhibits a superior adherence of the tobacco dust to the surface of the sheet. The product being smoother surfaced, it is less likely to lose dust in handling and it exhibits a more natural tobacco-like feel between the fingertips.

In the above discussion, reference is made to the optional step of hot pressing. The temperature must not be sufficiently high to change or alter the tobacco constituents in any deleterious way. Temperatures of approximately 180° F. in combination with relatively high pressures and short contact time, have been found effective. Similar results have been obtained at lower temperatures with comparatively higher pressures and higher moisture contents in the sheet. It should be noted that such pressing of the finished sheet does not result in a non-porous, high density product as would be obtained by calendering the wet stock before drying. It is thought that such a product would be inferior in taste on smok-

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ing because of excessive distillation and incomplete combustion resulting from its lack of porosity.

In Figure 5, a modified type of sheet or strip material L is shown in which the tobacco-coated surfaces of the reconstituted sheet, web or film material are treated with a small quantity of suitable adhesive A, such as the material used in making webs B and O, and then brought into juxtaposition and pressed, as described above, into adhering relationship. This gives a stronger product having smooth surfaces. It is sometimes helpful to dust the exposed surfaces of the so laminated sheet with talc or tobacco dust or other suitable material to prevent "blocking" (sticking together under pressure).

After being laminated, sheet or strip material L is moved to a dryer where the moisture content is reduced to any desired figure, e. g. 12%. At times it may then be advantageous to again brush the sheet to remove loosely adhering tobacco particles. The sheet or strip material L is then moved to a cutting device consisting of a rotating blade 38 and ledger blade 40, which cuts sheet or strip material L into desired lengths. If desired, however, laminated sheet or strip material L may be rolled into a reel (not shown), or it can be shredded by any suitable shredding device, such for example as that indicated in Rundell Patent 2,184,567 issued December 26, 1939.

Examples of typical film-forming solutions and dispersions are given as follows:

EXAMPLE 1

Sodium carboxymethylcellulose solution

Composition of base web:	Percent by weight
Sodium carboxymethylcellulose (high viscosity)	1.5
Kaolin	0.75
Glycerine	1.5
Water	96.25

EXAMPLE 2

Sodium carboxymethylcellulose solution

Composition of overlayer:	Percent by weight
Sodium carboxymethylcellulose (high viscosity)	1.0
Kaolin	0.5
Glycerine	1.0
Water	97.5

We have found that satisfactory results are obtained using high viscosity sodium carboxymethylcellulose (sodium cellulose glycolate) in concentrations between 1 and 8% by weight in water. In the case of the overlayer web, the concentration is usually lower than 8% by weight. Obviously low viscosity and medium viscosity sodium carboxymethylcellulose (sodium cellulose glycolate) in suitable concentrations may be used if desired but give less advantageous results.

In the above examples, the constituents are added in any order and mixed thoroughly. If kaolin is added, it is necessary to use a colloid mill or other known type of dispersing apparatus to disperse the kaolin uniformly.

As noted above, and in all other examples, it is preferrred to use a humectant and/or plasticizer such as glycerine which tends to prevent the final reconstituted tobacco sheet or web material from becoming too dry and brittle. In the examples given herein, the sodium salt of carboxymethylcellulose is used. However, if desired, other soluble carboxymethylcellulose salts, such as the potassium and ammonium salts, can be used.

EXAMPLES 3 AND 4

Acid carboxymethylcellulose dispersions

Percentages of materials used are the same as in Examples 1 and 2, except that carboxymethylcellulose (cellulose glycolic acid) is used as the film forming ingredient instead of sodium carboxymethylcellulose.

Typical dispersions can be prepared as follows: A 1/16 inch diameter stream of a 3.75 per cent high viscosity sodium carboxymethylcellulose solution in water is extruded into about twice its weigth of 20 per cent sulfuric acid. The sodium carboxymethylcellulose solution forms threads which are allowed to stand in the acid two hours to complete the acidification of the sodium carboxymethlcellulose. The threads of reacted carboxymethylcellulose are then removed from the acid by means of a suitable screen. The insoluble carboxymethylcellulose is then washed with a stream of water until the pH of a dispersion formed by processing a sample of the carboxymethylcellulose threads in a "Waring" blender is 2.4. At this point, the washing may be discontinued. The carboxymethylcellulose, which is now in the form of semi-solid, long, gelatinous strands, is then ground in a colloid mill, "Waring" blender, or similar device to produce a fine dispersion of carboxymethylcellulose in water.

The following conditions have been used to produce a satisfactory carboxymethylcellulose dispersion:

Conditions	Example 3	Example 4
Orifice diameter (Inches) (through which sodium carboxymethylcellulose solution is extruded into acid)	1/16	1/4
Concentration of sodium carboxymethylcellulose solution (wt. percent)	3.75	3.75
Weight of sodium carboxymethylcellulose solution (lbs.)	70	70
Concentration of H_2SO_4 solution (wt. percent)	20	20
Weight of H_2SO_4 solution (lbs.)	135	135
Acidification time (hours)	2	8
Washing time (hours) (water rate about 6 gals./min.)	1/2	3 1/2
pH of carboxymethylcellulose dispersion after washing and dispersing in colloid mill	2.4	2.4

To make a dispersion suitable for casting, the concentrated carboxymethylcellulose, prepared as described above, may be diluted to the desired concentration by the addition of water, the desired quantities of kaolin and glycerine added, and if desired, glyoxal may also be added, and the mixture dispersed in a colloid mill or other suitable device.

In forming satisfactory aqueous carboxymethylcellulose dispersions, it is found that good results are obtained when the concentration of the sodium salt of carboxymethylcellulose solution ranges between 2 and 8% by weight, and the final sulfuric acid concentration is between 5 and 25%. The time of acidification may vary over wide limits, as may the washing time. The pH of the final carboxymethylcellulose dispersion may also vary from about 1.5 to 5.0. Satisfactory results have been obtained using kaolin between 0 and 8% by weight, and glycerine ranging between 0 and 10% by weight based on the total weight of dispersion. When glyoxal is used, good results are obtained when the weight of glyoxal is between 0 and 20% of the weight of soluble cellulose glycolate salt or cellulose glycolic acid contained in the solution or dispersion.

The techniques described hereinabove for forming aqueous dispersions of cellulose glycolic acid are following in making aqueous dispersions of carboxymethyl hydroxyethyl cellulose which for our purpose has characteristics similar to those of cellulose glycolic acid. A satisfactory dispersion of acid carboxymethyl hydroxyethyl cellulose for use in forming sheet or strip material was made as follows:

EXAMPLE 5

Four and one-tenth grams of sodium salt of carboxymethyl hydroxyethyl cellulose were dissolved in water to form a thick paste. The paste was extruded through a 1/16 inch diameter orifice into 20% sulfuric acid and was permitted to stand in the acid for two hours. The

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hardened spaghetti-like threads of the insoluble acid form of carboxymethyl hydroxyethyl cellulose were removed from the acid, drained and washed with running water for twenty minutes. The washed threads were then dispersed in a manner similar to that described in Examples 3 and 4 to form an aqueous dispersion which was formed into a wet web which was coated with tobacco dust and dried to form a continuous reconstituted tobacco sheet and strip material.

In forming the webs decribed hereinabove, the solutions or dispersions can be applied to belt 8 by spraying, spreading with a casting knife, such as that described in co-pending Jurgensen and Hungerford application, Serial No. 49,968, filed September 18, 1948, for Film Casting Knife and Process, now U. S. Patent 2,546,342, issued March 27, 1951, or by other known web or film-forming devices. The amount of dispersion generally applied or cast upon belt 8 depends upon the strength desired in the final product, and the concentration and the composition of the dispersion. The quantity of film-forming material in overlayer O must be sufficient to secure the tobacco to the base web, and the thickness of web B must be sufficient to provide the strength desired.

Typical examples of base web, overlay and tobacco quantities are as follows:

EXAMPLE 6

Base web material	Example 1.
Thickness of base web (wet) in 1/1000 inch	8.
Overlay material	Example 2.
Thickness of overlay (wet) in 1/1000 inch	10.
Weight of reconstituted tobacco web material (gms./ft.^{2}) (dry).	8.
Weight of web, including fillers and humectants (gms./ft.^{2}), (dry) (not including tobacco).	1.3.

Figures 3 and 4 illustrate pieces or sheets of laminated reconstituted tobacco sheet or strip material L produced by our method. In Figures 3 and 4, and also in Figures 5 to 8 inclusive, T designates the tobacco dust and fine particles, and F indicates the tobacco-loaded continuous supporting film.

Figure 2 discloses a modified method which is generally similar to the method disclosed in Figure 1, except that it omits the formation of an overlayer web. As disclosed in Figure 2, any suitable film-forming dispersion or solution is prepared. This may be made from a water-soluble salt or carboxymethylcellulose or from carboxymethylcellulose in the manner described above in connection with the preferred method illustrated in Figure 1. To the prepared film-forming dispersion or solution is added, as at 46, a quantity of filler such as kaolin or fuller's earth which, as described above, increases the tensile strength of the film. Also, other strengthening and/or water-proofing additives such as glyoxal may be used. While the addition of a filler is desirable, it can be omitted since it is not essential to the production of a satisfactory reconstituted tobacco sheet material. After the filler has been admixed with the prepared film-forming dispersion or solution, the latter is formed into a wet web as at 48 on an endless conveyor belt 8 in the manner disclosed in Figure 1. An excess of tobacco dust is applied at 20 to the surface of the wet web and moisture is then removed therefrom by means of a suitable drying device indicated at 22. Following this operation, loosely adhering tobacco dust is removed by means of a suitable device designated 24. The resulting sheet or strip material W is then moistened as at 30, removed from conveyor 8 by a doctor blade 32, laminated as at 36, dried and then shredded or cut for packaging or manufacture into smoking articles as indicated at 52. In some cases, it may be desirable to again subject the laminated sheet or strip material to the action of a brushing or dust-removing device such as 54 after the removal of the laminated sheet or strip material from conveyor 8 and drying if for any reason tobacco particles have been loosened from the sheet or strip. This operation is not necessary, but in some cases has proven desirable. As noted above, single layer sheets can be produced by omitting the step of lamination. If desired, the product may be pressed, as disclosed above.

If desired, in the methods described above, tobacco dust can be applied to the undersurface (film side) of the reconstituted tobacco sheet or strip material W upon its removal from conveyor belt 8. If this is done, the underside of sheet or strip material W is moistened or coated with an adhesive, such as a light spray of the overlayer composition such as described in Example 2 or 4. An excess of tobacco dust is then applied to the wet undersurface of sheet or strip material W. The composite sheet or strip material resulting therefrom is then dried, excess tobacco is removed and a reconstituted tobacco sheet material or strip material designated W^1 having a tobacco coating on both sides, such as shown in Figure 6, is produced. Sheet or strip material W^1, if desired, can be pressed to compact the projecting tobacco particles and produce a sheet or strip having the general appearance of the sheet shown in Figure 8, except that it contains but a single layer of film-forming material.

If desired, narrow reconstituted tobacco filaments can be made by applying the above-described film-forming dispersions to the surface of endless traveling conveyor 8 by suitable casting or extruding mechanism, which can be similar to that disclosed in Wells et al. Patent 2,433,877, issued January 6, 1948, after which the filaments are coated with tobacco in the same manner as the webs or films formed in accordance with the methods disclosed in Figures 1 and 2.

While preferred embodiments of the invention have been shown and described, it is to be understood that the invention is not confined to the specific method steps and the details of construction of the apparatus for carrying out the methods herein set forth, by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

What is claimed is:

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1. Tobacco sheet material comprising an initially water insoluble water dispersed adhesive material and finely divided tobacco the principal portion of which is dry ground when associated with said adhesive material.

2. Tobacco sheet material comprising a water insoluble layer of film forming material and a coating of finely divided tobacco covering and adhering to the surface of said layer in excess of five times the weight of said film forming material on a dry basis per unit area.

3. Tobacco sheet material comprising a water insoluble layer of film forming material and a coating of finely divided tobacco covering and adhering to the surface of said layer in excess of two and less than twenty times the weight of said film forming material on a dry basis per unit area.

4. Tobacco sheet material comprising a water insoluble layer of film forming material and a coating of finely divided tobacco adhering to one surface or side of said layer of film forming material in excess of two and less than twenty times the weight of said layer of film forming material on a dry basis per unit area.

5. Tobacco sheet material comprising a water insoluble layer of film forming material and a coating of finely divided tobacco adhering to both surfaces or sides of said layer of film forming material in excess of two and less than twenty times the weight of said layer of film forming material on a dry basis per unit area.

6. Tobacco sheet material comprising a tobacco free layer of film forming material and a coating of finely divided tobacco covering adhering to the surface of said layer in excess of five times the weight of said film forming material on a dry basis per unit area.

7. Tobacco sheet material comprising a tobacco free

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layer of film forming material and a coating of finely divided tobacco covering and adhering to the surface of said layer in excess of two and less than twenty times the weight of said film forming material on a dry basis per unit area.

8. Tobacco sheet material comprising a tobacco free layer of film forming material and a coating of finely divided tobacco adhering to one surface or side of said layer of film forming material in excess of two and less than twenty times the weight of said layer of film forming material on a dry basis per unit area.

9. Tobacco sheet material comprising a tobacco free layer of film forming material and a coating of finely divided tobacco adhering to both surfaces or sides of said layer of film forming material in excess of two and less than twenty times the weight of said layer of film forming material on a dry basis per unit area.

10. Tobacco sheet material comprising a base web of tobacco free film forming material selected from the class consisting of cellulose glycolic acid, water soluble salts of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, and water soluble salts of carboxymethyl hydroxyethyl cellulose, an overlayer of a similar material covering the surface of said base web and forming therewith a composite web, and finely divided tobacco covering and adhering to said overlayer of said web.

11. Tobacco sheet material comprising a continuous self supporting web containing a film forming material selected from the class consisting of cellulose glycolic acid, water soluble salts of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose and water soluble salts of carboxymethyl hydroxyethyl cellulose, and tobacco dust covering and intimately adhering to the surface of said film in excess of five times the weight of said film forming material on a dry basis per unit area.

12. Tobacco sheet material comprising a continuous self supporting web containing a film forming material selected from the class consisting of cellulose glycolic acid, water soluble salts of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose and water soluble salts of carboxymethyl hydroxyethyl cellulose, and tobacco dust covering and intimately adhering to the surface of said film in excess of two and less than twenty times the weight of said film forming material on a dry basis per unit area.

13. Tobacco sheet material comprising a film of cellulose derivative film forming material selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, and tobacco dust covering and adhering to both surfaces of said film in excess of five times the weight of said film on a dry basis per unit area.

14. Tobacco sheet material comprising a film of cellulose derivative film forming material selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, and tobacco dust covering and adhering to both surfaces of said film in excess of two and less than twenty times the weight of said film on a dry basis per unit area.

15. Tobacco sheet material comprising two continuous tobacco free webs of film forming material adhered together, said film forming material being selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, and a coating of finely divided tobacco over the outer surface of each of said webs.

16. Tobacco sheet material comprising a web of film forming material selected from the class consisting of cellulose glycolic acid, water soluble salts of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose and

water soluble salts of carboxymethyl hydroxyethyl cellulose, an overlayer web of said forming material adhering to said base web and a substantially uniform coating of tobacco dust adhering to the surface of said overlayer web.

17. Tobacco sheet material comprising a composite sheet including a layer of tobacco free material selected from the group consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, and a layer of finely divided tobacco adhering to the surface of said tobacco free material.

18. Tobacco sheet material comprising a composite film consisting of cellulose glycolic acid and substantially uniformly distributed finely divided tobacco adhering to said film and forming an integral part thereof.

19. Tobacco sheet material comprising a composite sheet consisting of a thin substantially water insoluble film of carboxymethyl hydroxyethyl cellulose, and finely divided tobacco particles adhering to and substantially uniformly covering the surface of said film.

20. Tobacco sheet material comprising a film of carboxymethyl cellulose, and tobacco dust in a quantity at least five times the weight of said film of carboxymethyl cellulose per unit area, the tobacco dust constituting a covering adhering to said film.

21. Tobacco sheet material comprising a film of carboxymethyl cellulose, and tobacco dust in a quantity at least two and less than twenty times the weight of said film of carboxymethyl cellulose per unit area, the tobacco dust constituting a covering adhering to said film.

22. Tobacco sheet material comprising two continuous lengths of film consisting of carboxymethyl cellulose, each of said lengths of film having a coating of tobacco dust substantially uniformly covering one surface thereof, the uncoated surfaces of said films being adhered together and forming a laminated web construction.

23. Tobacco sheet material comprising a continuous tobacco free film of a water soluble salt of cellulose glycolic acid and a coating of finely dvided tobacco covering the surface of said film and adhering thereto.

24. Tobacco sheet material comprising a continuous tobacco free film of a water soluble salt of carboxymethyl hydroxyethyl cellulose and a coating of finely divided tobacco covering the surface of said film and adhering thereto.

25. A method of forming tobacco sheet material which comprises contacting an initially water insoluble adhesive material dispersed in water with finely divided tobacco the principal portion of which is dry ground.

26. The method of making tobacco sheet material comprising preparing a dispersion of a film forming material which becomes substantially water insoluble when dry, adding a small quantity of a film strengthening filler to said dispersion, converting said dispersion into a thin continuous base web, preparing an overlayer dispersion from a similar film forming material which becomes substantially water insoluble when dry, adding a small quantity of a humectant to said overlayer dispersion, applying a thin coating of said overlayer dispersion upon the surface of said base web in permanently adhering relationship therewith to produce a composite web structure having a wet adhesive surface, heavily loading said wet surface with tobacco dust particles, drying said tobacco loaded web, removing loose tobacco from said tobacco dust loaded web, and forming said resulting tobacco web material into sheets of desired lengths and widths.

27. The method of making tobacco sheet material comprising forming a thin continuous adhesive web having a wet adhesive surface, applying tobacco dust substantially uniformly upon said surface of said web while adhesive to form a composite heavily loaded tobacco coated web drying said heavily loaded web, brushing loose tobacco from said composite tobacco dust coated web, ap-

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plying an adhesive to the tobacco coated surface of said tobacco web, bringing lengths of said web having adhesive tobacco coated surfaces into contacting engagement, and pressing said lengths together to form tobacco sheet material.

28. The method of making tobacco sheet material comprising forming an aqueous dispersion of adhesive film forming material into a thin wet adhesive film having an adhesive surface when said film is wet, said film being substantially water insoluble when dry, applying a heavy coating of finely divided tobacco to said wet adhesive film to form a tobacco loaded web and to adhere to said film a quantity of tobacco in an amount in excess of five times the weight of said film on a dry basis per unit area, and drying said web to form substantially water insoluble tobacco sheet material.

29. The method of making tobacco sheet material comprising forming an aqueous dispersion of adhesive film forming material into a thin wet adhesive film having an adhesive surface when said film is wet, said film being substantially water insoluble when dry, applying a heavy coating of finely divided tobacco to said wet adhesive film to form a tobacco loaded web and to adhere to said film a quantity of tobacco in an amount in excess of two and less than twenty times the weight of said film on a dry basis per unit area, and drying said web to form substantially water insoluble tobacco sheet material.

30. The method of making tobacco sheet material comprising forming a viscous aqueous film forming dispersion containing an adhesive, film forming material, which becomes substantially water insoluble when dry, into a thin base web having an exposed wet adhesive surface, coating said wet adhesive surface with finely divided tobacco to form a composite tobacco sheet material and drying said sheet material to render it substantially water insoluble.

31. The method of forming tobacco sheet material which comprises applying to the surface of a non fibrous layer of wet film forming material a layer of finely divided tobacco to form a composite lamellar sheet and drying said sheet to adhere a weight of said tobacco in excess of five times the weight of said film forming material on a dry basis per unit area.

32. The method of forming tobacco sheet material which comprises applying to the surface of a non fibrous layer of wet film forming material a layer of finely divided tobacco to form a composite lamellar sheet and drying said sheet to adhere a weight of said tobacco in excess of two and less than twenty times the weight of said film forming material on a dry basis per unit area.

33. The method of making tobacco sheet material comprising forming from an adhesive tobacco free film forming material selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, a thin continuous composite web having an adhesive surface, applying tobacco dust substantially uniformly upon said adhesive surface of said web and in excess of the amount of tobacco dust required to cover and to load said surface of said web, drying said tobacco coated composite web, and forming said resulting tobacco material into sheets.

34. The method of making tobacco sheet material comprising forming from a compound selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, a thin continuous tobacco free base web, applying an overlayer of film forming material selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, to said base web to form a composite web having an exposed wet

surface, coating said exposed wet surface with tobacco particles to form a composite film, drying said tobacco coated composite film, moistening the uncoated faces of two sections of said tobacco coated film with an aqueous medium containing a film forming material selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, and assembling said sections with said moistened faces in contacting engagement to form laminated tobacco sheet material.

35. The method of producing tobacco sheet material comprising forming a thin, continuous tobacco free base web on a film forming surface from a film forming material selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, drying said web, applying an overlayer of a film forming material selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, over the surface of said base web, said overlayer adhering to and forming with said base web a thin composite web structure, heavily coating only one surface of said overlayer while wet with tobacco particles, drying said tobacco coated web, and laminating lengths of said composite tobacco web with the surfaces not coated with tobacco in face to face relation to form tobacco sheet material.

36. The method of producing tobacco sheet material comprising forming from an adhesive film forming material selected from the group consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, a thin, continuous tobacco free film on a film forming surface, applying to said film on said film forming surface while said film forming material is wet and adhesive, a loading in excess of five times the weight of said film in dry condition of finely divided tobacco, drying said tobacco coated film whereby said film forming material becomes substantially water insoluble and said tobacco coating becomes adhered to said film forming material, increasing the moisture content of said tobacco loaded film and removing said tobacco loaded film from said surface to form tobacco sheet material.

37. The method of producing tobacco sheet material comprising forming from an adhesive film forming material selected from the group consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, a thin, continuous tobacco free film on a film forming surface, applying to said film on said film forming surface while said film forming material is wet and adhesive, a loading in excess of two and less than twenty times the weight of said film in dry condition of finely divided tobacco, drying said tobacco coated film whereby said film forming material becomes substantially water insoluble and said tobacco coating becomes adhered to said film forming material, increasing the moisture content of said tobacco loaded film and removing said tobacco loaded film from said surface to form tobacco sheet material.

38. The method of producing tobacco sheet material comprising preparing a viscous adhesive film forming material selected from the class consisting of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose, water soluble salts of cellulose glycolic acid and water soluble salts of carboxymethyl hydroxyethyl cellulose, converting said film forming material into a thin, continuous base web, preparing an overlay from a similar less viscous adhesive film forming material, applying a thin coating of said overlay over a surface of said base web to produce a composite web structure having an adhesve surface,

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traveling surface and removing said loaded web from said surface.

48. The method of making tobacco sheet material comprising forming an aqueous stable dispersion of carboxymethyl hydroxyethyl cellulose, converting said dispersion into a thin continuous web, applying tobacco dust substantially uniformly over the surface of said web, drying said dust coated web and removing substantially all loose tobacco dust from said tobacco coated web.

49. The method of making tobacco sheet material comprising forming a tobacco free solution from a soluble salt of carboxymethyl cellulose, converting said solution into a thin continuous base web, preparing an overlayer from a similar film forming material, applying a thin coating of said overlayer over a surface of said base web to form a composite web structure having a wet adhesive surface, coating said web surface substantially uniformly with tobacco dust particles, drying said tobacco coated web and removing loose tobacco from said tobacco dust coated web to form said tobacco sheet material.

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UNITED STATES PATENT OFFICE 10003310824

CERTIFICATE OF CORRECTION

Patent No. 2,734,510 February 14, 1956

Gordon P. Hungerford et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 9, line 48, for "or",first occurrence, read --of--; column 18, line 21, list of references cited, under the heading "FOREIGN PATENTS" for "8,570" read --8,540--.

Signed and sealed this 9th day of October 1956.

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(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents

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and coating said adhesive surface of said overlay while wet with finely ground tobacco particles to form tobacco sheet material.

39. The method of forming tobacco sheet material, comprising forming a thin, continuous tobacco free web from a film forming material selected from the class consisting of cellulose glycolic acid, water soluble salts of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose and water soluble salts of carboxymethyl hydroxyethyl cellulose, then applying a coating of finely divided tobacco to one of the surfaces of said web while it is wet to form a tobacco coated web, drying said coated web, applying to the uncoated surface of said web an adhesive material selected from the class consisting of cellulose glycolic acid, water soluble salts of cellulose glycolic acid, carboxymethyl hydroxyethyl cellulose and water soluble salts of carboxymethyl hydroxyethyl cellulose to render said uncoated surface adhesive, applying a coating of finely divided tobacco to the adhesive uncoated surface of said web and drying said resulting tobacco sheet material.

40. The method of forming tobacco sheet material which comprises applying to the surface of a wet adhesive layer of cellulose glycolic acid, a layer of finely divided tobacco to form a composite lamellar sheet and drying said sheet to form tobacco sheet material.

41. The method of making tobacco sheet material comprising forming an aqueous dispersion of cellulose glycolic acid, casting said dispersion into an endless film on an endless traveling surface, coating said film on said surface with a dispersion of cellulose glycolic acid to provide said film with a wet adhesive overlayer, applying tobacco dust substantially uniformly over said wet overlayer in an amount sufficient to heavily load said film, drying said dust loaded film, removing substantially all loose tobacco dust from said tobacco loaded film and removing said film from said traveling film forming surface.

42. The method of producing tobacco sheet material comprising preparing an aqueous film forming dispersion of cellulose glycolic acid film forming material, adding a relatively small quantity of a filler material to a first portion of said dispersion to increase the tensile strength of the film produced therefrom, continuously forming said first portion of said dispersion on a substantially impermeable film forming surface into a thin, endless, water insoluble web, continuously applying the remainder of said dispersion as an overlayer of an aqueous insoluble film forming dispersion over the entire surface of said first portion of dispersion in permanently adhering relationship therewith to form a composite continuous web having an exposed wet surface, coating said exposed wet surface with finely divided tobacco particles in excess of five times the weight of said web on a dry basis per unit area, drying said heavily tobacco loaded composite continuous web whereby said web becomes water insoluble, brushing loose tobacco particles from said tobacco coated surface of said tobacco coated web, moistening said brushed tobacco coated composite web and removing it from said film forming surface, and then drying said web to form tobacco sheet material.

43. The method of producing tobacco sheet material comprising preparing an aqueous film forming dispersion of cellulose glycolic acid film forming material, adding a relatively small quantity of a filler material to a first portion of said dispersion to increase the tensile strength of the film produced therefrom, continuously forming said first portion of said dispersion on a substantially impermeable film forming surface into a thin, endless, water insoluble web, continuously applying the remainder of said dispersion as an overlayer of an aqueous insoluble film forming dispersion over the entire surface of said first portion of dispersion in permanently adhering relationship therewith to form a composite continuous web having an exposed wet surface, coating said exposed wet surface with finely divided tobacco particles in excess of two and less than twenty times the weight of said web on a dry basis per unit area, drying said heavily tobacco loaded composite continuous web whereby said web becomes water insoluble, brushing loose tobacco particles from said tobacco coated surface of said tobacco coated web, moistening said brushed tobacco coated composite web and removing it from said film forming surface, and then drying said web to form tobacco sheet material.

44. The method of forming tobacco sheet material comprising forming a tobacco free film forming composition of a soluble salt of cellulose glycolic acid, casting said composition on an endless traveling surface into a continuous wet web, applying tobacco dust substantially uniformly upon the wet web on said surface, said dust being applied in excess of the amount required to cover said surface of said web substantially uniformly, drying said dust loaded web, removing loose tobacco from said tobacco loaded web, moistening said web and removing said web from said traveling surface, drying said web, and forming said resulting tobacco material into sheets.

45. The method of making tobacco sheet material comprising forming an aqueous dispersion of cellulose glycolic acid, casting said dispersion into a continuous web on an endless traveling surface, coating said web on said surface with a dispersion of cellulose glycolic acid to provide said web with a wet adhesive overlayer to form a composite cellulose glycolic acid film having a wet adhesive surface, said film when dry being substantially water insoluble, applying tobacco dust to said wet overlayer in an amount sufficient to cover substantially uniformly the overlayer surface of said web, drying said dust loaded web, removing substantially all loose tobacco dust from said loaded tobacco web, removing said web from said traveling film forming surface, the tobacco dust adhering to and intimately associated with said web being greatly in excess by weight of the weight of said web of cellulose glycolic acid per unit area, subjecting said tobacco sheet material thus produced to heat and pressure to position projecting tobacco particles in substantially contiguous relationship relative to the plane of said composite web, moistening with an adhesive material the tobacco free faces of lengths of said tobacco coated composite web, arranging said lengths with said moistened faces in contacting engagement, pressing said lengths together to form laminated tobacco sheet material, and then brushing said faces of said laminated tobacco sheet material to remove loose tobacco therefrom.

46. The method of forming tobacco sheet material comprising forming a tobacco free film forming composition of a soluble salt of cellulose glycolic acid, casting said composition on an endless traveling surface into a wet continuous web, applying tobacco dust substantially uniformly upon the wet web on said surface, said dust being applied in excess of the amount required to load said web substantially uniformly with a predetermined quantity of tobacco per unit area of said web, drying said dust loaded web, removing loose tobacco from said tobacco loaded web, moistening said web and removing said web from said traveling surface, drying said web, treating the uncoated surface of said tobacco material web to render it tacky, arranging lengths of said treated web with said tacky surfaces in contacting engagement, and pressing said lengths together to form a laminated tobacco material web structure.

47. The method of making tobacco sheet material comprising forming a tobacco free film forming composition of a soluble salt of carboxymethyl hydroxyethyl cellulose, casting said composition on an endless traveling surface into a continuous web having a wet surface, applying tobacco dust upon the wet surface of said web, said dust being applied in excess of the amount required to cover substantially uniformly said surface of said web, drying said dust loaded web, removing loose tobacco from said tobacco loaded web, moistening said tobacco loaded web to facilitate its removal from said endless

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